Advant® OCS

Advant OPC Server for Advant Fieldbus 100

Version 1.1

Product Guide

3BSE 017 810R101

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Chapter 1 Overview

1.1 Introduction

The Advant OPC Server for Advant Fieldbus 100 is a standard OPC interface for Advant Fieldbus 100, based on the Windows NT operating system. The Advant Fieldbus OPC Server enables data exchange between Windows applications and stations on the Advant Fieldbus 100 network. The Advant Fieldbus OPC Server can be used by client applications with support for the mandatory custom interface, the automation interface and the alarms and events interface according to the OPC Foundation standard. Supported OPC Functionality is described in Section 3.1.2, Advant OPC Server for Advant Fieldbus 100.

1.2 Positioning and Features

The Advant OPC Server for Advant Fieldbus 100 provides OPC client applications, such as Human Machine Interface (HMI) products or custom-built applications, access to process objects in Advant Controllers (AC160, AC110, AC70 and AC80[1]). The Advant OPC Server can also be used together with the Advant Controller 400 Series controllers with limited functionality. Limitations in the Advant Controller 400 Series is described in Section 3.2.2, Limitations for Advant Controller 400 Series controllers.

1.3 Product Benefits

The Advant Fieldbus OPC Server provides an open standard interface, supporting any client package that uses the OPC interface. This allows you to use the Advant OPC Server for Advant Fieldbus 100 together with HMI products of your own choice, as OPC is supported by many 3rd party vendors of industrial PC software.

The Advant OPC Server for Advant Fieldbus 100 is well integrated with the AMPL Control Configuration product. The Advant OPC Server for Advant Fieldbus 100 can directly use the object configuration data from the AMPL Control Configuration. I.e. you only need to enter object configuration data once to configure both the controller nodes and the Advant OPC Server for Advant Fieldbus 100.

1.4 News

The Advant OPC Server for Advant Fieldbus 100*1.1 includes support of the OPC Automation Interface based on the OPC Data Access Specification 1.0A for higher level applications developed in for example Visual Basic for applications.

This version also includes the alarm and event functionality according to the OPC Alarms and Events Specification version 1.0, i.e. the Advant OPC Server for Advant Fieldbus 100*1.1 can be configured to receive time tagged events from the Advant Fieldbus 100 network.

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[1] Not verified in Product Type Test.

Chapter 2 Product Configuration Example

2.1 General

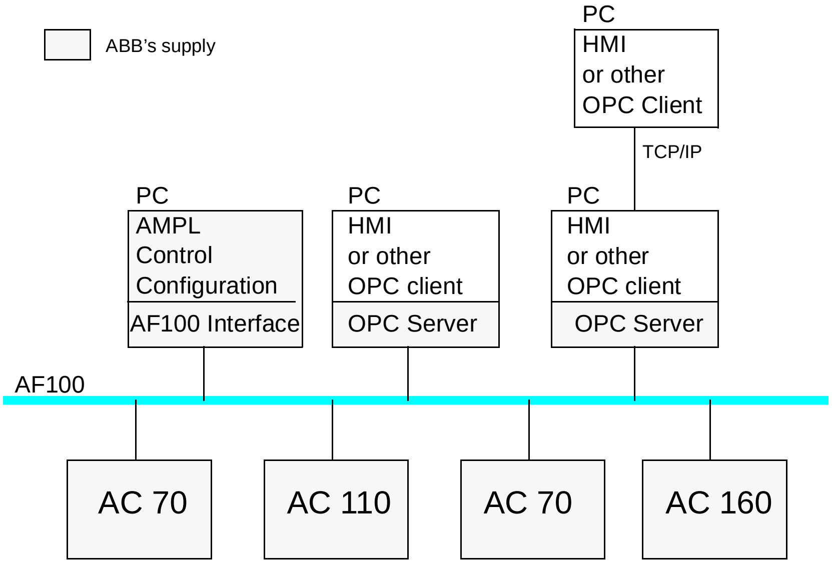

Figure 2-1. Example of an installation with Advant OPC Server for Advant Fieldbus 100

The Advant OPC Server for Advant Fieldbus 100 enables communication with AC70, AC110, AC160 and other nodes that can be connected to the Advant Fieldbus 100 network.
For the AC160 controller the multiple CPUs and redundancy concept is valid.

Chapter 3 Functional Description

3.1 General

3.1.1 OLE for Process Control (OPC)

OLE for Process Control (OPC) is an emerging software technology standard that connects Windows based process control systems to hardware devices on the plant floor.
OPC is based on Microsoft’s COM/OLE technologies, a specification that defines how individual software components can interact and share data under Windows. There are two sets of interfaces, OPC Custom interfaces for high performance applications written in a compiled language such as C++, and the OPC Automation interface for higher level applications developed in for example Visual Basic for Applications.

3.1.2 Advant OPC Server for Advant Fieldbus 100

TheAdvant OPC Server for AF100 software enables data exchange between Windows applications and stations on the Advant Fieldbus 100 network.

The Advant OPC Server for Advant Fieldbus 100 can be used by any client application with support for the mandatory OPC Custom Interface, the OPC Automation Interface as well as the OPC Alarms and Events Interface according to the OPC Foundation standard.

The Advant OPC Server for AF100 1.1 is based on the OPC Data Access Specification version 1.0A and the OPC Alarms and Events Specification version 1.0.

OPC Custom Interface

The OPC Custom Interface is used for high-performance applications written in a compiled language such as C++.

OPC Automation Interface (valid for Data Access)

The OPC Automation Interface for higher level applications developed in for example Visual Basic for applications.

OPC Alarms and Events Interface

The OPC Alarms and Events Interface is used for broadcasting alarm and event information from servers to clients.

Optional IOPCBrowseServerAddressSpace

The IOPCBrowseServerAdressSpace provides a way for clients to browse the available data items in the server.

You can find information about the specifications and the work of the OPC Foundation at the OPC Foundation home page: *www.opcfoundation.org*.

3.1.3 Advant Fieldbus 100

The Advant Fieldbus 100 is a high performance bus specially designed for real time applications. It features reliable, cyclic data transfer using DataSet Peripherals (DSP) as well as event driven background transfer of service data.

3.1.4 Advant Fieldbus 100 Communication

The Advant OPC Server for Advant Fieldbus 100 Software and Hardware enables communication with the Advant Fieldbus 100 network.

There are two mechanisms for communication on the Advant Fieldbus 100:

- DataSet Peripheral (DSP)

  DSPs are broadcasted cyclically to all stations on the Advant Fieldbus 100 network. The DSP communication is configured and handled by the CI526V1 board. The Advant Fieldbus 100 OPC software has functions to read and write data to these DSPs. The DSPs are used to transfer values for process objects on the Advant Fieldbus 100 network.

- Service Data Protocol (SDP)

  The SDP is used to transfer messages between applications in different stations on the Advant Fieldbus 100 network. SDP is used for service requests (command) to process objects and for receiving time tagged events (Event Sets). SDP is also used by AMPL Control Configuration when connecting to the Advant Controller 70/110/160 using the Advant Fieldbus 100 Interface.

NOTE

For the Advant Controller 400 Series, only DataSet Peripherals (DSP) can be used. (Time tagged events and Service Data Protocol (SDP) for commands are **not** supported.)

3.2 Functionality

The Advant OPC Server for Advant Fieldbus 100 provides the following functionality:

- Object Handling

  The Advant OPC Server for Advant Fieldbus 100 supports two groups of objects, Extended DB Elements and DAT based objects. The DAT based objects have limited functionality compared with Extended DB Elements, which provides an almost identical object support that exists within the Advant Controller 400 series for corresponding object types. For these groups of objects the Advant OPC Server for Advant Fieldbus 100 provides the following object handling functions:

  – Data Subscription

    Values for process objects are received from the Advant Fieldbus 100 network using cyclic DataSet Peripherals (DSP). Alarm Limits, for the Extended DB Elements only, are received from the Advant Fieldbus 100 network using Service Data Protocol.

    Subscription of other object attributes such as object description, engineering unit, etc., is also provided. These attributes are not transferred via the Advant Fieldbus 100 network, but retrieved from the Bus Configuration Database in AMPL Control Configuration.

  – Service requests

    Service requests (commands) can be sent from the application to change object attributes on the Advant Fieldbus 100 network. For DAT based objects the attribute Value can be changed in the controller and Acknowledge is processed by the OPC Server itself. For Extended DB Elements, the Value, Block, Deblock and Acknowledge are examples of attributes that are changeable in the controller.

  – Event Handling

    The Advant OPC Server for Advant Fieldbus 100 can be configured to receive time tagged events, via Event Set (EVS), from the Advant Fieldbus 100 network.

    The time tagged events contain object information such as the reason for the event and a time stamp. This information, together with user-defined object information such as object description, engineering unit, etc., can be used by the client application to generate events and alarms.

    For DAT based objects, alarm acknowledgment by the client application can be distributed on the Advant Fieldbus 100 network to other PCs equipped with the Advant OPC Server for Advant Fieldbus 100 or AdvaSoft for Windows. This is done automatically for Extended DB Elements.

- Alarms and Events Interface

  Alarms and events are distributed on the AF100 bus and are accessible according to the OPC Alarm and Event Specification version 1.0 from the OPC Foundation.

- Time Synchronization

  The Advant OPC Server for Advant Fieldbus 100 can act as clock master, slave or master backup node on the Advant Fieldbus 100 bus.

- Support for AMPL Control Configuration

  All object configuration is done in the AMPL Control Configuration. The configuration data is stored in the Bus Configuration Database, where it is accessible by the Advant OPC Server for Advant Fieldbus 100 via the Bus Configuration Interface. The Advant Fieldbus 100 Interface, used together with the Function Chart Builder (FCB), provides remote engineering of nodes on the Advant Fieldbus 100 bus.
  You only need to enter object configuration data once to configure both the controller and the Advant OPC Server for Advant Fieldbus 100.

  NOTE

  The Advant Fieldbus 100 Interface software can also be ordered separately.

- Hardware Configuration and Diagnostics

  It is possible to view and change the configuration parameters for the CI526V1 communication board.

  The Mutual Lifesign Supervision function in the Advant OPC Server for Advant Fieldbus 100 supervises the CI526V1 board and automatically tries to restart it in case of board failure. If the Advant OPC Server for Advant Fieldbus 100 has an uncontrolled stop the CI526V1 board goes to passive state and the DSP transmission stops.

- System Status

  This function shows nodes reachable via the Advant OPC Server for Advant Fieldbus 100.

- System Messages

  System messages are presented in the System Message Viewer.

3.2.1 Available services for applications

Table 3-1 below shows available services for applications supported for each object type using the Advant OPC Server for Advant Fieldbus 100.

Table 3-1. Services provided to application using Advant OPC Server for Advant Fieldbus 100

Object type	Demand	Cyclic	Event	Command
DAT_AI(1)/AIS(2)	yes	yes	yes	yes
DAT_AO(1)/AOS(2)	yes	yes	yes	yes
DAT_DI(1)/DIS(2)	yes	yes	yes	yes
DAT_DO(1)/DOS(2)	yes	yes	yes	yes
DAT_DAT(1)	yes	yes	no	yes
MB(3)	yes	yes	yes	yes

Table 3-1. Services provided to application using Advant OPC Server for Advant Fieldbus 100

Object type	Demand	Cyclic	Event	Command
MBS(3)	yes	yes	yes	yes
MR,MI and MIL(3)	yes	yes	no	yes

(1) These are DAT Based Elements object types. They are mapped on DAT's and transferred with DataSet Peripherals (DSP) for subscription and Service Data Protocol (SDP) for commands.

(2) These objects are the Extended DB version of the AI, AO, DI and DO objects.

(3) These objects belong to the Extended db Elements object group but are mapped towards DAT objects

Table 3-2 shows supported service requests (commands) via the Advant OPC Server for Advant Fieldbus 100 for DAT based objects (DAT_AI, DAT_AO, DAT_ DI, DAT_ DO and DAT_DAT) and for Extended DB Elements (AIS, AOS, DIS, DOS, DAT, MR, MB, MI and ML).

Table 3-2. Supported Service Requests (Commands) via the Advant OPC Server

Operation	DAT_AI/ AIS	DAT_AO/ AOS	DAT_DI/ DIS	DAT_DO/ DOS	DAT_DAT(1)
Select/Deselect	no/yes	no/yes	no/yes	no/yes	no
Block/Deblock Print	no/yes	no	no/yes	no	no
Block/Deblock Input	no/yes	no	no/yes	no	no
Block/Deblock Output	no	no	no	no	no
Man/Auto	no	no	no	no	no
Change Value	yes	yes	yes	yes	yes

(1) The object types MR, MB, MI and ML supports the same commands as the DAT_DAT object.

3.2.2 Limitations for Advant Controller 400 Series controllers

The Extended DB elements are not supported for Advant Controller 400 Series controllers, only DAT based elements can be used. The Advant Controller 400 Series does not support the Service Data Protocol (SDP) and all Service requests (commands) must be sent with sending DataSet Peripherals from the Advant OPC Server for Advant Fieldbus 100.

The AMPL Control Configuration 1.5 does not fully support generation of configuration data for the Advant Controller 400 Series. The Advant Controller 400 Series DAT based object must be configured in the AMPL Control Configuration as objects in an Advant Controller 110. This support is improved in AMPL Control Configuration 1.6. Therefore, it is strongly recommended to upgrade from version 1.5 to version 1.6.

Chapter 4 Software and Hardware Components

4.1 Software and Hardware Components

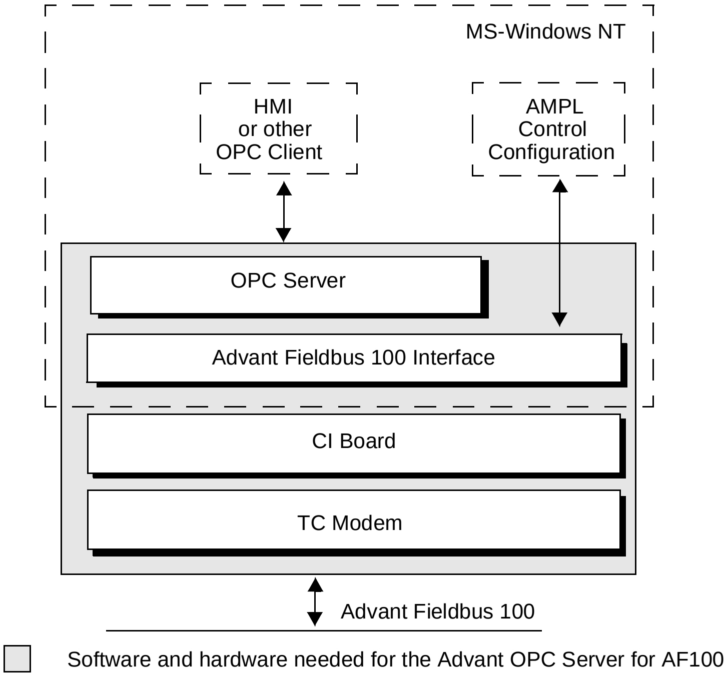
MS-Windows NT
HMI or other OPC Client
AMPL Control Configuration
OPC Server
Advant Fieldbus 100 Interface
CI Board
TC Modem
Advant Fieldbus 100
Software and hardware needed for the Advant OPC Server for AF100

Figure 4-1. Advant OPC Server for Advant Fieldbus 100 Software Conceptual Overview

The Advant OPC Server for Advant Fieldbus 100 software enables data exchange between Windows OPC clients and stations on the Advant Fieldbus 100 network.
The AMPL Control Configuration uses the Advant Fieldbus Interface for communication with nodes on the Advant Fieldbus 100 bus.

The Advant OPC Server for Advant Fieldbus 100 software uses the following hardware:

- CI526V1 communication board
- modems
  - TC625 for coaxial cable
  - TC512 for twisted pair cable
  - TC630K03 optical modem
  - TC513 converter modem - coaxial/twisted pair or twisted pair/coaxial cable
  - TC514 converter modem - twisted pair/optical or optical/twisted pair cable
  - TC515 Advant Fieldbus 100 rep. modem - twisted pair/twisted pair cable
- cables

  TK549 coaxial cable

  TK515 twisted pair cable
- SB512 power supply
- mounting plate and net cable

The CI526V1 board and modem are used for connection to the Advant Fieldbus 100 bus.
The CI526V1 board uses one full length ISA slot in the personal computer (PC). The interface can be connected to coaxial or twisted pair bus cables and also to an optical bus. The coaxial and twisted pair connections are available with both single and redundant buses. The optical connection is only available with a single bus.

Table 4-1. Advant OPC Server for Advant Fieldbus 100 Software and Hardware

Component	**AF100 OPC Server**
Advant OPC Server for Advant Fieldbus 100	yes
Advant Fieldbus 100 Interface	yes
AMPL Control Configuration	option
Advant Fieldbus 100 Interface HW, Single Coaxial bus cable	option
Advant Fieldbus 100 Interface HW, Redundant Coaxial bus cable	option
Advant Fieldbus 100 Interface HW, Single Twisted pair bus cable	option
Advant Fieldbus 100 Interface HW, Redundant Twisted pair bus cable	option
Advant Fieldbus 100 Interface HW, Single Optical bus cable	option

Chapter 5 Requirements and Compatibility

5.1 Hardware Requirements

In Table 5-1 you will find the minimum requrements for the Advant OPC Server for Advant Fieldbus 100.

Table 5-1. Minimum recommended hardware for the Advant OPC Server for AF100

Component	
Personal computer (PC)	Pentium Pro II 233
Primary memory (RAM)	64 Mb
CD	1
No of spare standard PC AT slot (fullsized board)	1

The selected personal computer must be designed to withstand climatic, mechanical and electrical effects in the intended environment.

NOTE

The hardware requirements for the OPC client must also be considered.

5.2 Operating System Requirements

- Windows NT version 4.0 with service pack 3 or later.
  Windows 95/98 is not supported.

5.3 Compatibility

The Table 5-2 shows supported Advant Fieldbus 100 options in different controllers.

Table 5-2. Supported options for different controllers

Options	**Controller/Controller version**				
	AC 70 ver 1.0	**AC 110/ ver. 2.0**	**AC 110/ ver. 2.1 or later**	**AC160/ ver 1.0 or later**	**AC 400 series**
Extended DB elements	No	No	Yes	Yes	No
DAT based Objects	Yes	Yes	Yes	Yes	Yes(1)
SDP	Yes	Yes	Yes	Yes	No
Event handling	Yes	Yes	Yes	Yes	No(2)
AF100/Optical Bus	No(3)	No(3)	No(3)	No(3)	Yes
AF100/Coaxial Bus	No(3)	Yes	Yes	Yes	Yes
AF100/Twisted Pair Bus	Yes	Yes	Yes	Yes	Yes

(1) Limited support in AMPL Control Configuration for generation of configuration data
(2) Can only receive (not send) Event Set from the Advant Fieldbus 100.
(3) Modems to convert between bus types are available.

Recommendations:

- Advant Controller 400 Series with Master Software.
- Advant Controller 110 version 2.0 or later, except for AC 110*2.0/2. Version 2.0 only supports for DAT based objects.
  Recommended version 2.0/5 or later.
- Advant Controller 110 version 2.1 or later.
  Support for both Extended Database elements and DAT based objects.
  Recommended version 2.1/2 or later.
- Advant Controller 70 version 1.0 or later. Recommended version 1.1/2 or later.
  Only DAT based objects are supported.
- Advant Controller 160 version 1.0 or later.

Tools:

- AMPL Control Control Configuration version 1.6 or later.
- Internet Explorer version 4.01 with SP2 or later.

Chapter 6 Capacity and Performance

6.1 Capacity

Table 6-1 gives configuration guidelines when using Advant OPC Server for Advant Fieldbus 100.

Table 6-1. Configuration on Advant Fieldbus 100

Configuration guidelines	Maximum no of Advant OPC Server for Advant Fieldbus 100	Total no of Objects on Advant Fieldbus 100
	10	5000

- One Advant OPC Server for Advant Fieldbus 100 can handle up to 15 Advant Controllers 110/70.
- One Advant Fieldbus 100 (coax cable) can have up to 80 nodes connected.
- On Advant Fieldbus 100 with twisted pair, up to 32 nodes are possible per segment, several segments may be connected via modems to handle up to 80 nodes.
- One Advant Controller 110, 70 or 160 can communicate with up to 10 Advant OPC Server for Advant Fieldbus 100, AdvaSoft for Windows or Advant Controller 400 Series nodes simultaneously.

Always when the system is configured the bus load on the AF 100 must be checked.

The capacity of the Advant OPC Server for Advant Fieldbus 100 is limited by the CI board capacity. The capacity of the CI board is indicated in Table 6-2 below.

Table 6-2. Advant Fieldbus 100 Interface Capacity

Description	Data
Total no. of DataSet Peripherals	4000
Cycle times depending on configuration in AC100 series	1, 2, 4,... 4096 ms

As each DataSet Peripheral can reference to up to eight DAT elements, the maximum number of DATs is 32 000.

The Advant Fieldbus 100 runs a data rate of 1.5 MBits/sec. Some of the information is, however, used for preambles, cyclic redundancy checks and protocol overhead; as a result, the net data rate is somewhat less.

The transfer times for DataSet Peripherals depend on the number of attached DAT elements (see Table 6-3).

Table 6-3. DataSet Peripheral transfer time

DSP size		Transfer time (ms)
1	DAT element	0.088
2	DAT elements	0.108
3-4	DAT elements	0.156
5-8	DAT elements	0.252

The Advant Fieldbus 100 bus load has to be calculated when the system is configured.The bus load depends on the DataSet Peripheral configuration and can be calculated using the following formula:

$$BusLoad = \sum\left(\frac{Nbr \cdot Ttr}{cT}\right) \cdot 100$$

This formula provides the bus load as a percentage, where the sum is taken over all different sending DSPs and:

Nbr =number of DSPs (of the same data size and cT)
Ttr =transfer time in ms (from Table 6-3)
cT =desired cycle time in ms (1, 2, 4, 8, 16…4096).

In order to guarantee that message transfer is possible, at least 25% of the bus bandwidth is reserved for message transfer (Event Set and command signals). Up to 70% of the bandwidth may be used freely for DataSet Peripheral communication

6.2 Performance

The performance of the Advant OPC Server depends on the client application program and the Windows NT system load. Refer to chapter 5.1 Hardware Requirements for recommendations on hardware.

6.2.1 PCs used during Performance Test

HP Kayak XA Pentium II 300 MHz, 64MB RAM

6.2.2 HMI clients used during the Performance Test

FIX Dynamics for NT4

ProcessX Explorer by Matrikon Consulting Inc.

6.2.3 Object Update Time

A data request was done for two different clients and with varying number of items requested. The data was received from the Advant OPC Server for Advant Fieldbus 100 and updated within the clients within the times described by Figure 6-1. .

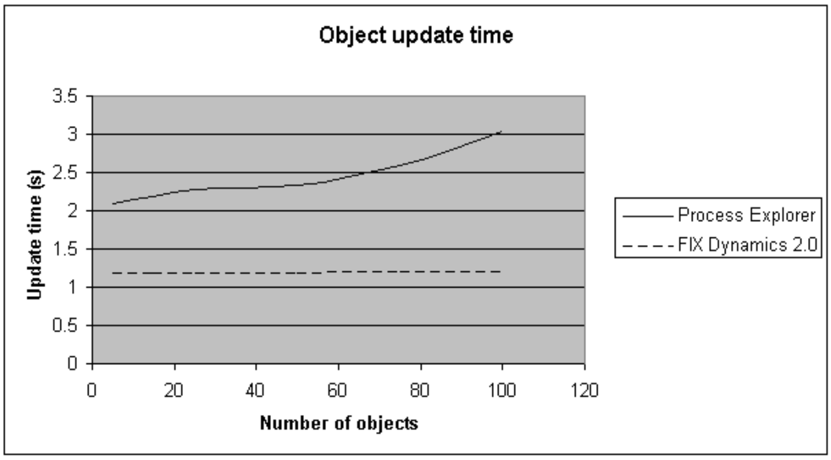

Figure 6-1. Update time

The times were measured from call up of display until all attributes in the display were updated for different number of objects.

The figure above shows update times for AIS with two attributes (name and value). The same test has been performed with all object types, for DAT based objects as well as for Extended DB elements. The update times for all object types were similar.

6.2.4 Cyclic subscription

The OPC client (FIX) can present all value changes for at least 20 AIS, updated with a cycle time of 160 msec in the Advant OPC Server for Advant Fieldbus 100.

6.2.5 Command Response Time

When sending 50 commands from ProcessX Explorer, the command response time is approximately 10 seconds until the last command’s response is returned.

Chapter 7 Environmental Immunities

The selected personal computer for the Advant OPC Server for Advant Fieldbus 100 must be designed to withstand climatic, mechanical and electrical effects in the intended environment.

The general immunity of Advant OCS to environmental factors is summarized in *Product Guide Advant OCS with Master SW, Overview.*

The Advant OCS system has been designed to withstand the environments encountered in the power and process industries with respect to climatic, mechanical and electrical effects.

Products in the Advant OCS range, manufactured by ABB or others, are type tested or evaluated to ensure compliance with the environmental requirements specified below.

These requirements can be categorized as follows:

- Resistance to the external environment outside enclosures (including corrosive gases)
- Resistance to the environment inside enclosures
- Electro Magnetic Compatibility
- Electrical safety.

The environmental specifications applicable to third party equipments, for example, PC:s and printers, may differ. Refer to the data sheets of the products concerned.

The degree to which the units withstand environmental influence depends on their components and their design. The system enclosures, the types of cable and how these are routed determine the environmental requirements of the complete system.

Chapter 8 Ordering

8.1 General

For the Advant OPC Server for Advant Fieldbus 100 the following pricelist is applicable: 3BSE014368.

Advant OPC Server for AF100 Software

Table 8-1. Advant OPC Server for Advant Fieldbus 100 Licence

Description	Consists of	Ordering No.
Advant OPC Server for Advant Fieldbus 100 SW, **first user license**		3BSE014801R2
Advant OPC Server for Advant Fieldbus 100 SW, **additional user license**		3BSE015979R2

Media

Table 8-2. Software Delivery Media

Description	Consists of	Ordering No.
Advant OPC Server for Advant Fieldbus 100 SW **Software Distr. Media CD-ROM**		3BSE015980R2

Advant OPC Server for Advant Fieldbus 100 Options

Software Options

Table 8-3. Software options

Description	Consists of	Ordering No.
AMPL Control Configuration		Refer to Advant Engineering Products price list

Hardware

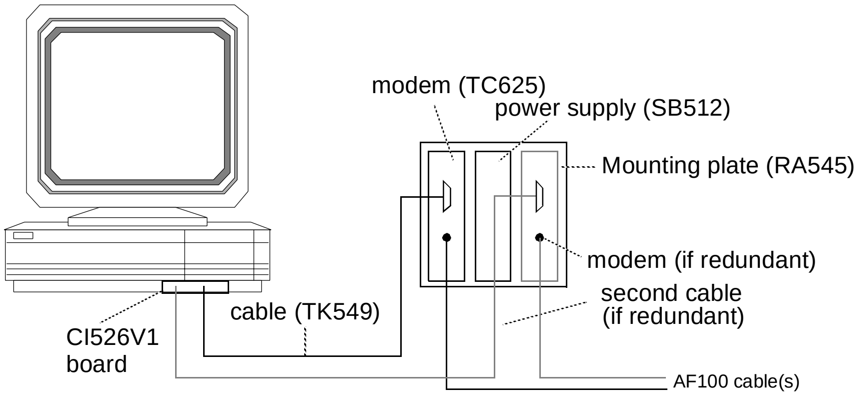

Figure 8-1. Coaxial, single and redundant connections

Table 8-4. Advant OPC Server for AF100 Hardware, Single coaxial bus cable

Description	Consists of	Ordering No.
Advant Fieldbus 100 Interface HW, single coaxial bus cable	CI526V1 comm board, TC625 modem, SB512 power supply, RA545 mounting plate, TK549 cable	3BSE014804R1
Connection kit	AF100K03	3BSE006251R1

Table 8-5. Advant OPC Server for AF100 Hardware, redundant coaxial bus cable

Description	Consists of	Ordering No.
Advant Fieldbus 100 OPC Interface HW, redundant coaxial bus cable,	CI526V1 comm board, 2xTC625 modem, SB512 power supply, RA545 mounting plate, 2xTK549 cable	3BSE014805R1
Connection kit	AF100K02	3BSE005545R1

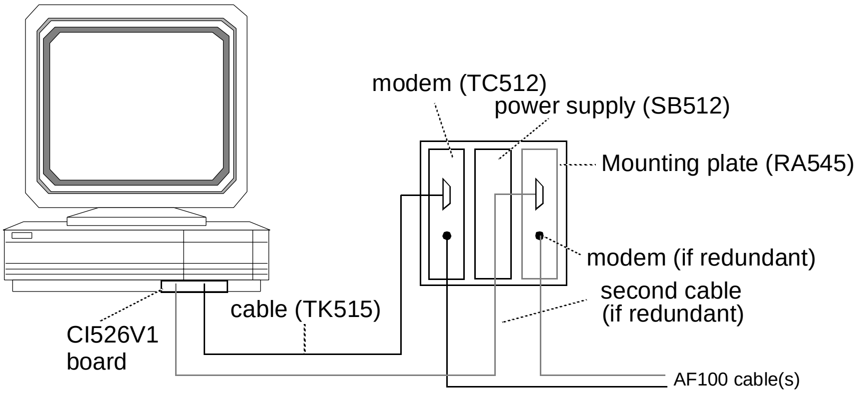

Figure 8-2. Twisted pair , single and redundant connections

Table 8-6. Advant OPC Server for AF100 Hardware, single twisted pair bus cable

Description	Consists of	Ordering No.
Advant Fieldbus 100 Interface HW, single twisted pair bus cable,	CI526V1 comm board, TC512 modem, SB512 power supply, RA545 mounting plate, TK515 cable	3BSE014802R1

Table 8-7. Advant OPC Server for AF100 Hardware, redundant twisted pair bus cable

Description	Consists of	Ordering No.
Advant Fieldbus 100 Interface HW, redundant twisted pair bus cable,	CI526V1 comm board, 2xTC512 modem, SB512 power supply, RA545 mounting plate, 2xTK515 cable	3BSE014803R1

Table 8-8. Advant OPC Server for AF100 Hardware, Miscellaneous

Description	Consists of	Ordering No.
Terminator kit(1)	BCNK40	3BSE006244R1

(1)For termination of one coaxial connection.

Documentation

Table 8-9. Documentation on Advant OPC Server for Advant Fieldbus 100

Title	Description	Article No.
Advant OPC Server for Advant Fieldbus 100 User's Guide	User's Guide describes the Advant OPC Server for Advant Fieldbus 100	3BSE013896R101
Advant Fieldbus 100 User's Guide	User's Guide describes the Advant Fieldbus 100 network	3BSE000506R701
Application Builder User's Guide	User's Guide describing installation of Advant Engineering components and contains the operation instruction of Application Builder and Advant Engineering support functions	3BSE007031R601
Function Chart Builder User's Guide	User's Guide describing how to configure Advant OCS controllers with the Function Chart Builder	3BSE007149R701
Bus Configuration Builder User's Guide	Describes bus configuration support functions from Advant Fieldbus 100 OPC based and AdvaSoft for Windows based Human Machine Interface Systems	3BDS100312R101
AMPL Configuration Advant Controller 100 Series Ref. Manual	Contains instructions about configuration and application programming, fault tracing and maintenance of AC 160/AC110/AC70/AC55.	3BSE009626R301

3BSE 017 810R101

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